

Introduction to Python

Elements of Applied Data Security M

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Outline

- Lab's objectives and modalities
- Conda and Visual Studio
- Python: what and why
- Hands on

Objectives

1. Hands-on approach to learn methods and algorithms explained in the theory lessons
 - Focus on concepts and working principles
 - Minor concerns on implementation details
2. Get experienced with Python programming language
 - Start with the basics (assuming you have C/C++ background)

Exam

The exam is split into **lab** and **theory** parts.

- **Lab** and **Theory** are independent exams.
 - They can be taken in either order.
 - Both exams have no expiration date.
 - Both can be taken the same date as well as in different dates.
- The **course grade** is the average between lab and theory grades.
- Exam dates (exact dates to be defined):
 1. Week 9-13 June 2025
 2. Week 30 June - 4 July 2025
 3. Week 21-25 July 2025
 4. Week 1-5 September 2025

Lab Exam

Assignments – for attending students

1. On a bi-weekly basis, the student submits an assignment that will be graded out of 30.
2. The average over the 4/5 assignments is the starting grade at the exam.

Project – for non-attending students

1. Propose or ask for a project.
2. Submit the project that will be graded out of 30 and will be the starting grade at the exam.

In both cases – **exam** (optional)

- A student can choose not to take the exam, and the final grade is the starting grade **limited to 24**.
- The exam consists of a discussion of the submitted assignments/project whose purpose is:
 - to assess whether the student is the author – and confirm the starting grade.
 - to assess if the student can address some of the weaknesses in the assignments/project – and possibly increase the starting grade.
- If the student fails, the student must present a new project.

How it works

1. Python Tutorial

- Soft start with Python
- Homework (no mark)

2. Assignments

- You can work in groups (max 3 students)
- Submission:
 - **notebook** (report + code) uploaded on [Virtuale](#).
 - deadline on **Tuesday at 12pm** of the second week
- Mark for each assignment from 0 to 30.

Assignment Scoring System

- Functionality of the code: max 20 points
 - Code quality and readability: max 5 points
 - Report (structure/content): max 5 points
-
- All the assignments must follow the attached template, if provided. Such templates are meant to guide the student throughout the initial assignments.

Assignment Upload

- Assignments must be uploaded on Virtuale *before* the deadline.
- Projects submitted by other means or after the deadline will not be reviewed and evaluated.
- The use of Jupyter Notebooks is mandatory so that both code and report are within the same file.
- Additional «.py» files are also accepted.
 - Example: «main.ipynb» + «module.py» (optional)

Final project

- If the final average grade of all assignments falls below 18, then the student must submit a project to gain access to the lab exam.
- Details of the final project will be given in May.
If you want to start working earlier, please contact us.
- The project can be submitted at any time. However, please note that the **project evaluation takes 1 week**, and it usually takes a few revision rounds to get a grade >18.
- The project is **individual**.

Any questions?

Workspace Setup

Two available options:

- Work on your personal computer
- Work on a machine in LAB2
 - Get remote access to the machine by installing a Microsoft RDP client on your computer

LabXRemote

- remo.ing.unibo.it
- Student -> Welcome
- Choose available Lab -> Lab0
 - An autoconfig file will be generated (works for both Windows and MacOS)
 - Double-click on the file to run it
- To login
 - Use your lab credentials: LABS/username
 - Or create an account here: <https://remo.ing.unibo.it/app/student/infoy>



Conda

- an open-source **package** and **environment management system**
 - installs, runs and updates packages and their dependencies
 - creates, saves, loads and switches between environments on your local computer
- runs on Windows, macOS and Linux
- can handle any language:
 - Python, R, Ruby, Lua, Scala, Java, JavaScript, C/ C++, FORTRAN, and more

Here a post from *conda-docs*: [Getting Started with Conda](#)

Installing Conda

- Download the latest version of **miniconda3** from here
<https://docs.conda.io/en/latest/miniconda.html>
- Install it by following the instructions in here
<https://conda.io/projects/conda/en/latest/user-guide/install/index.html>
where you can find a step by step guide for any platform: Windows, Linux or macOS.

Opening conda

- On either Windows or macOS, find the **Anaconda Prompt** in the list of your programs and open it.
- On Linux, open a **Terminal** and run the following command:

```
$ conda activate base
```

After that, we are in conda and (hopefully) there will be no difference between any platform.

Create and activate an environment

- Once you open anaconda prompt you activate the environment with the following command:

```
$ conda create -n envname
```

- Once created, you have to activate it:

```
$ conda activate envname
```


Installing Python libraries

- Once activated the environment, we can install some packages with the following commands:

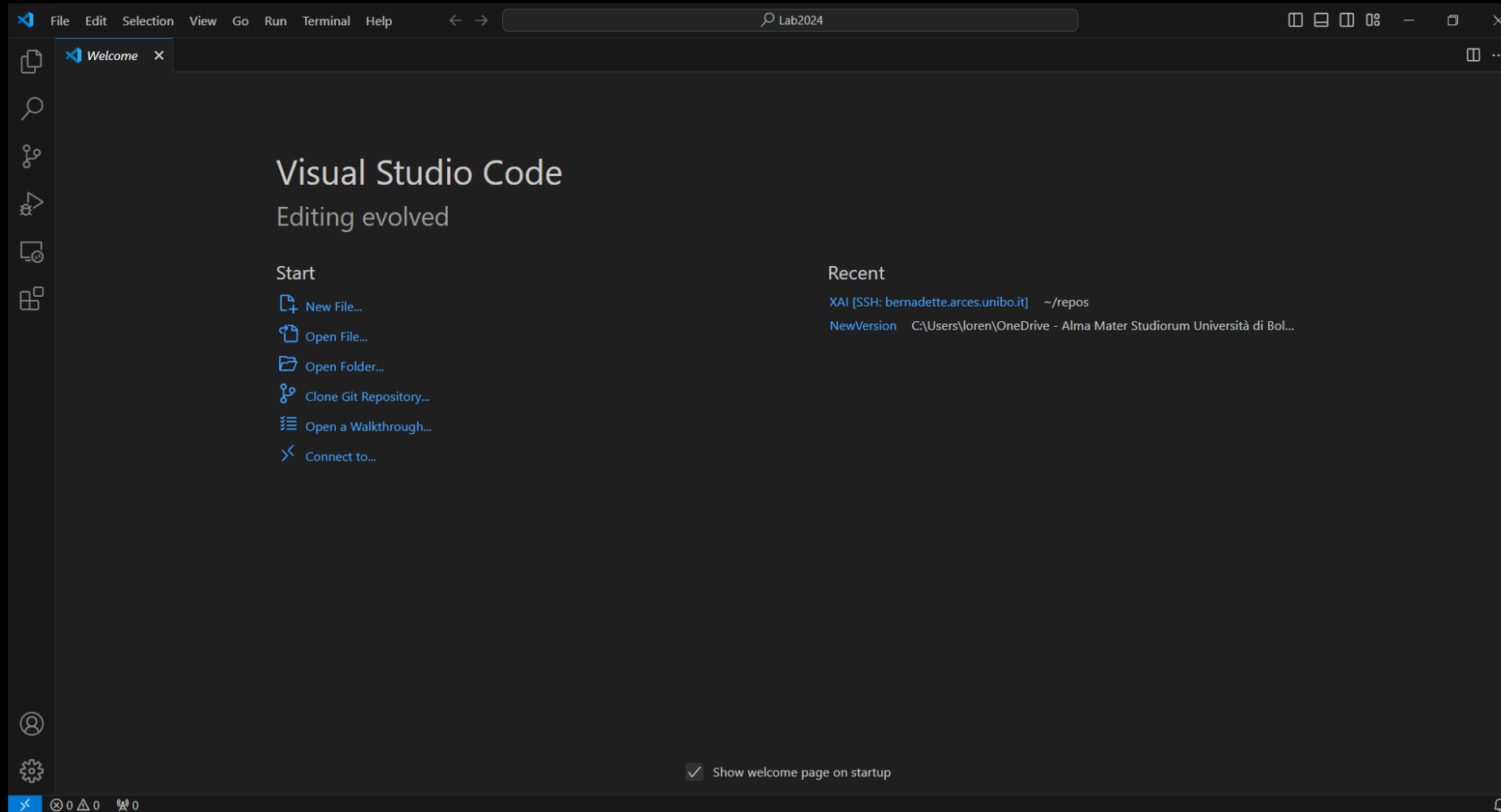
```
$ conda install ipyml
```

```
$ conda install scipy
```

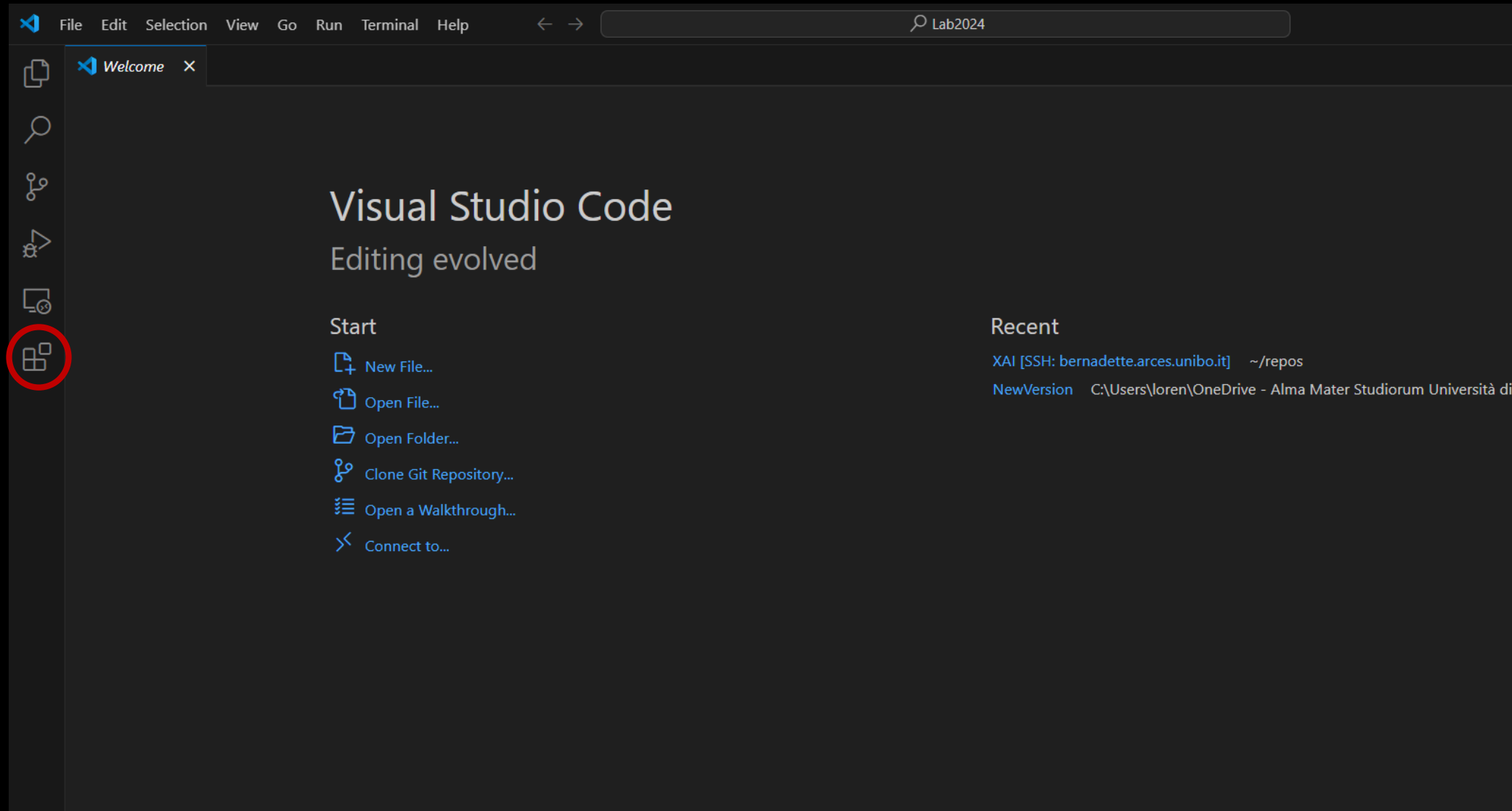
```
$ conda install matplotlib
```

```
$ conda install pycryptodomex
```

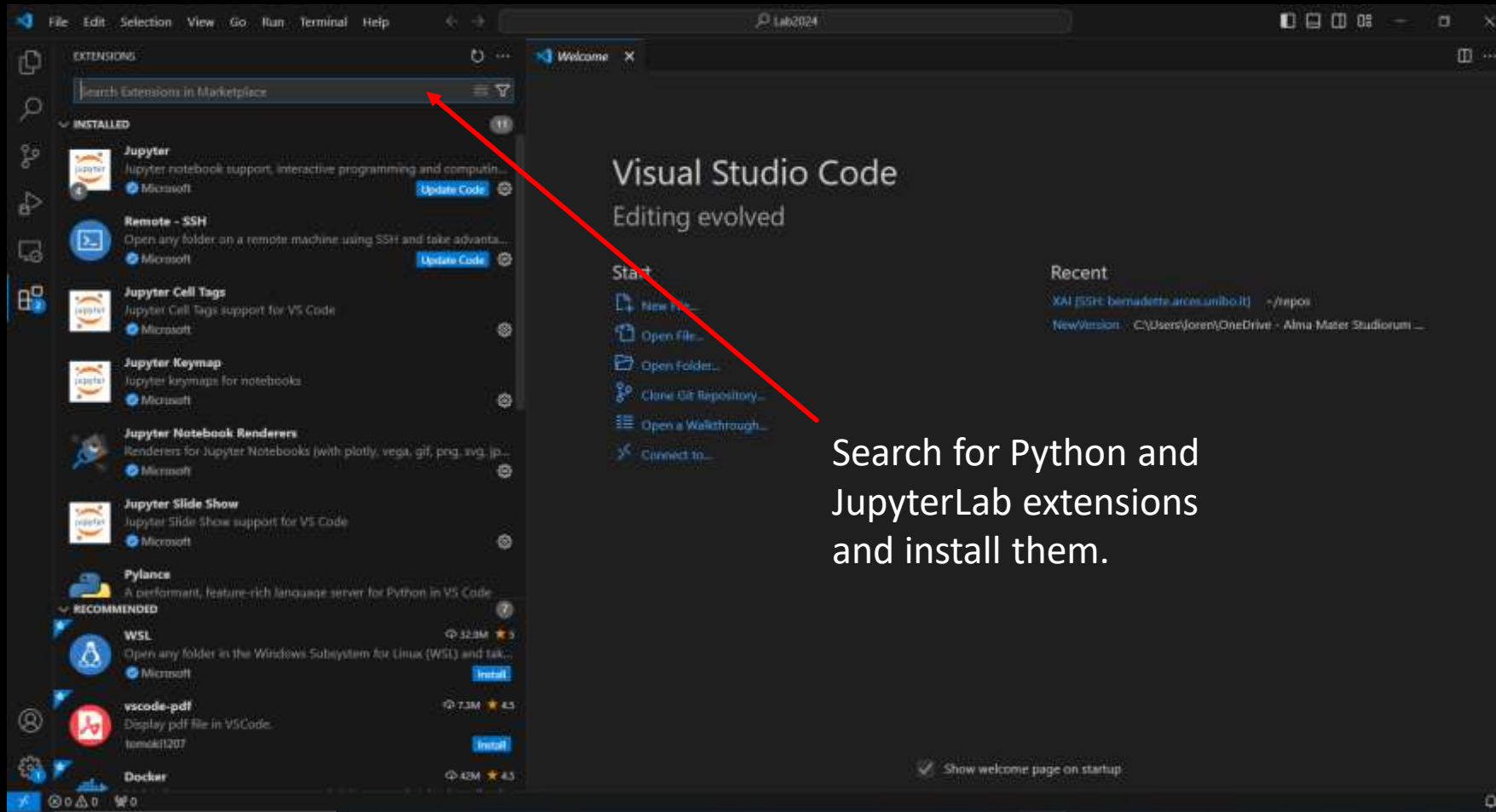
Python and JupyterNotebook in VSCode



Python and JupyterNotebook in VSCode

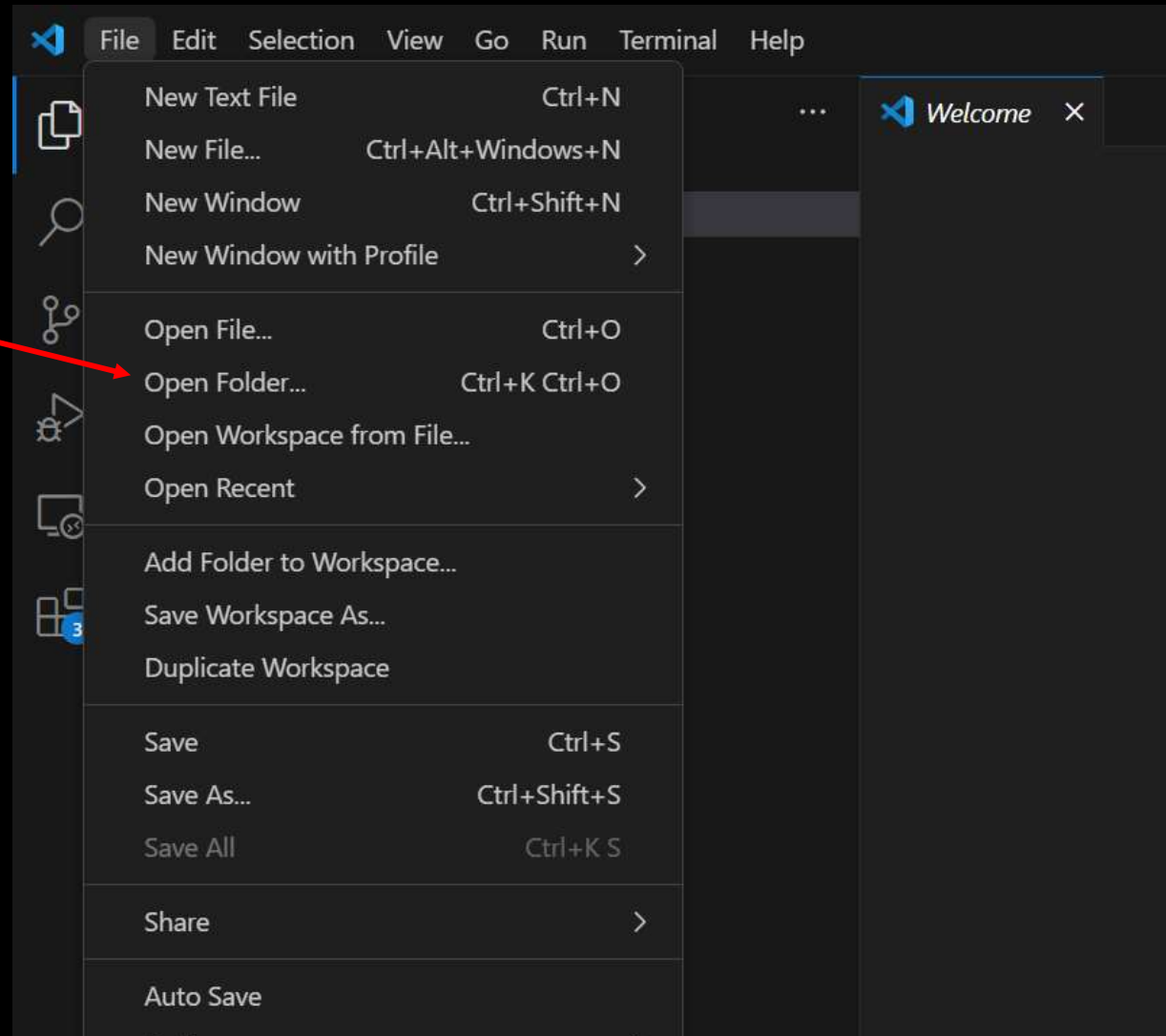


Python and JupyterNotebook in VSCode



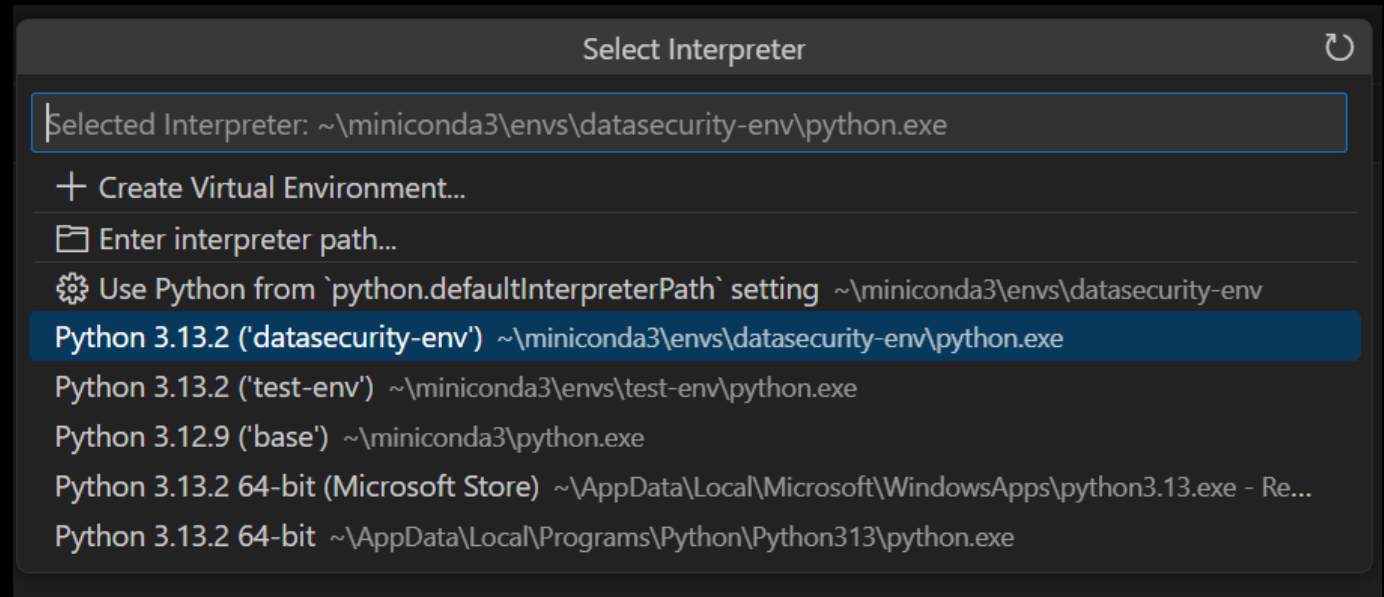
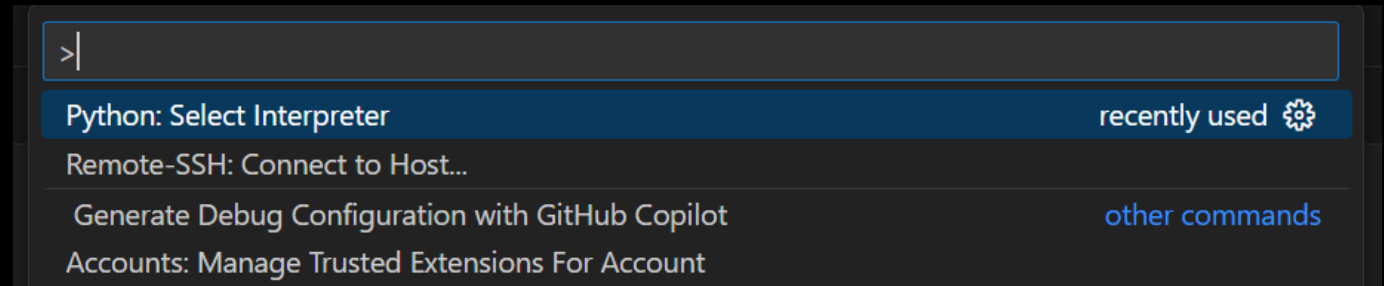
Start working in VSCode

- Download the first folder assignement on Vitrtuale
- Search for it in VSCode



Activate the enviroment

- Ctrl+Shift+P
- Choose Python: Select Interpreter
- Then select the environment you created in conda



Otherwise use Google Colab

READY TO CODE





Python is an Interpreted and Object-Oriented Programming Language.

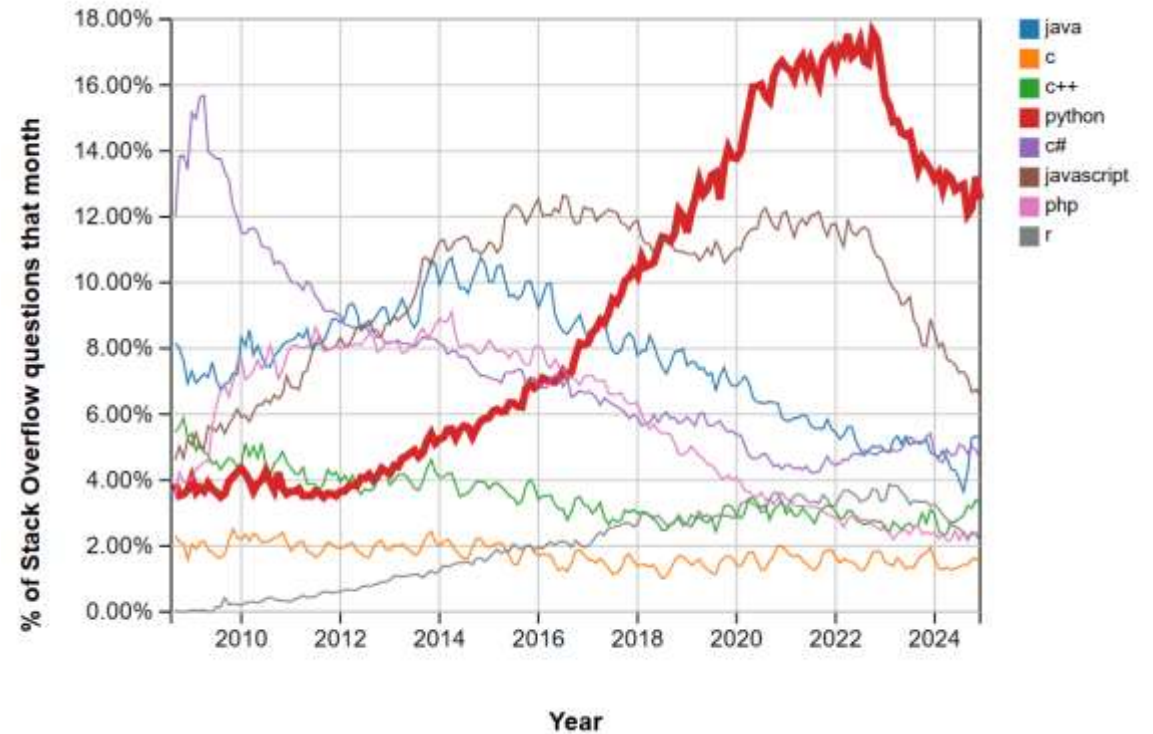
WHY Python?

- Simple syntax
- Very flexible
- Highly extensible
- Cross-platform
- Open-source with a huge community

Google says: *Python where we can, C++ where we must*

Popularity

- According to StackOverflow's [survey](#) and [trends](#), Python among all programming languages is the:
 - **1st** most questioned
 - **3rd** most popular behind JavaScript, HTML/CSS
 - **1st** most wanted developers who do not yet use it say they want to learn it



Applications

- Scientific and Numeric (especially Data Science & Machine Learning)
- Web and Internet Development
- Education
- Desktop GUIs
- Software Development
- Business Applications

Basically anything, like English for spoken languages

Homework

- **No mark will be given**, the goal is to get experienced with what has been explained in this class
- Read the text file *wikipedia_cybersecurity.txt*
- Build a function that given a certain letter of the English alphabet, returns its occurrence in the text
- Build a function that given a text, returns the English letters distribution (frequency) contained in a suitable data structure
- Visualize the letters distribution by means of the most appropriate plot
- Save the data structure as a *.pkl* (“pickle”) file